Electronic Supplementary Information for

"Two Conformational States of Glu242 and pK_a's in Bovine Cytochrome *c* Oxidase"

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This document contains details on a strength of the coupling of redox state of heme *a* or Cu_B, or the protonation state of His291 on the pK_a of Glu242. Also, the coupling of the redox states of metal centers and the protonation/conformation state of Glu242 on the pK_a of His291 is displayed.

The data are derived from the DFT/continuum electrostatic calculations on the dependence of pK_a's on conformational changes of Glu242 residue in various redox states of the enzyme (cytochrome *c* oxidase) and presented in the form of figures for the different dielectric models used in our study.

Figure S1 (A) The influence of the redox state of heme *a* and Cu_B and protonation state of His291 on the pK_a of Glu242 (ε_{prot} = 4 and ε_{cavity} = 15). For each redox state (OORO, ORRO and OORR) the two possibilities are presented, one when His (shown as a circle) is protonated and the other when it is deprotonated. For each of these six cases the two pK_as of Glu242 are given depending on its conformation, upper and down values. To compare the energetic stability of the two states for a given redox state of metal centers, the pK_as of Glu242 are shown in blue (more stable) and red color (less stable states). For instance, in OORO and ORRO redox states, energetically is more stable the state with deprotonated His291, while in OORR state it is more stable the one with protonated His. The total charge of the porphyrins of heme *a* and a_3, and Cu_B center including corresponding protonation state of His291 is given in brackets. Oxidized porphyrin possesses a charge of +1, while the reduced one has zero charge; oxidized Cu_B is +2, reduce Cu_B is +1; and for deprotonated His one needs to subtract 1.

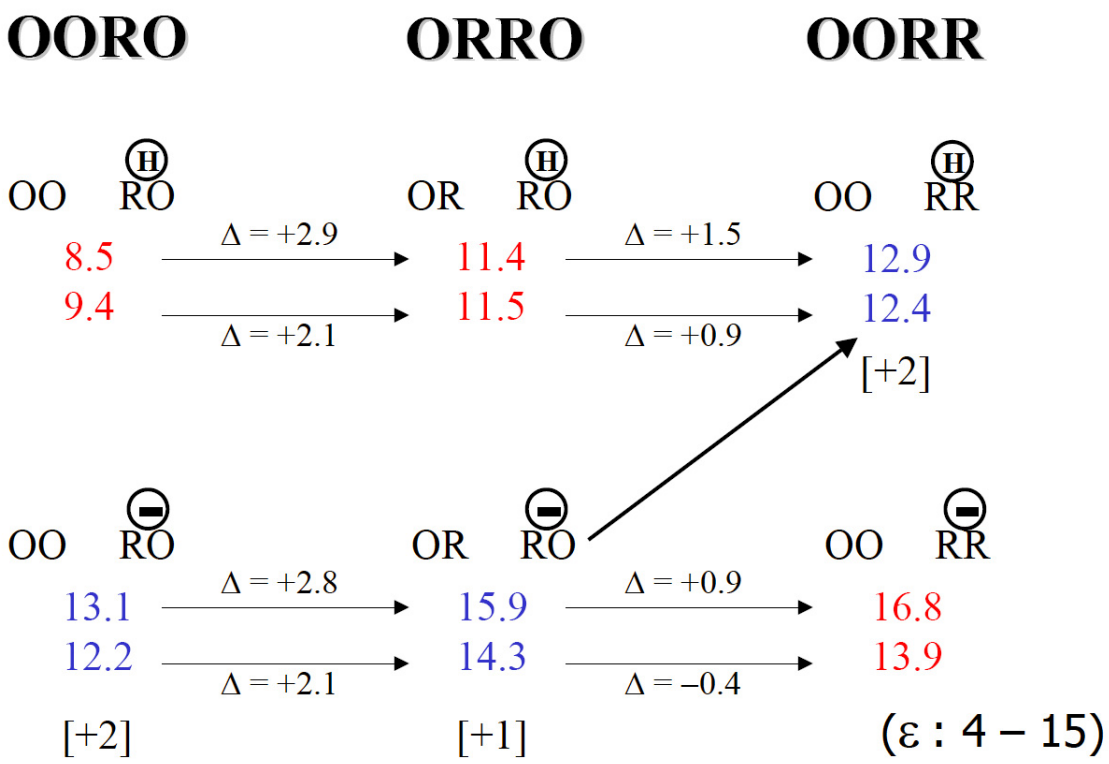

Figure S1 (B) The results for the dielectric medium of $\varepsilon_{prot} = 4$ and $\varepsilon_{cavity} = 80$.

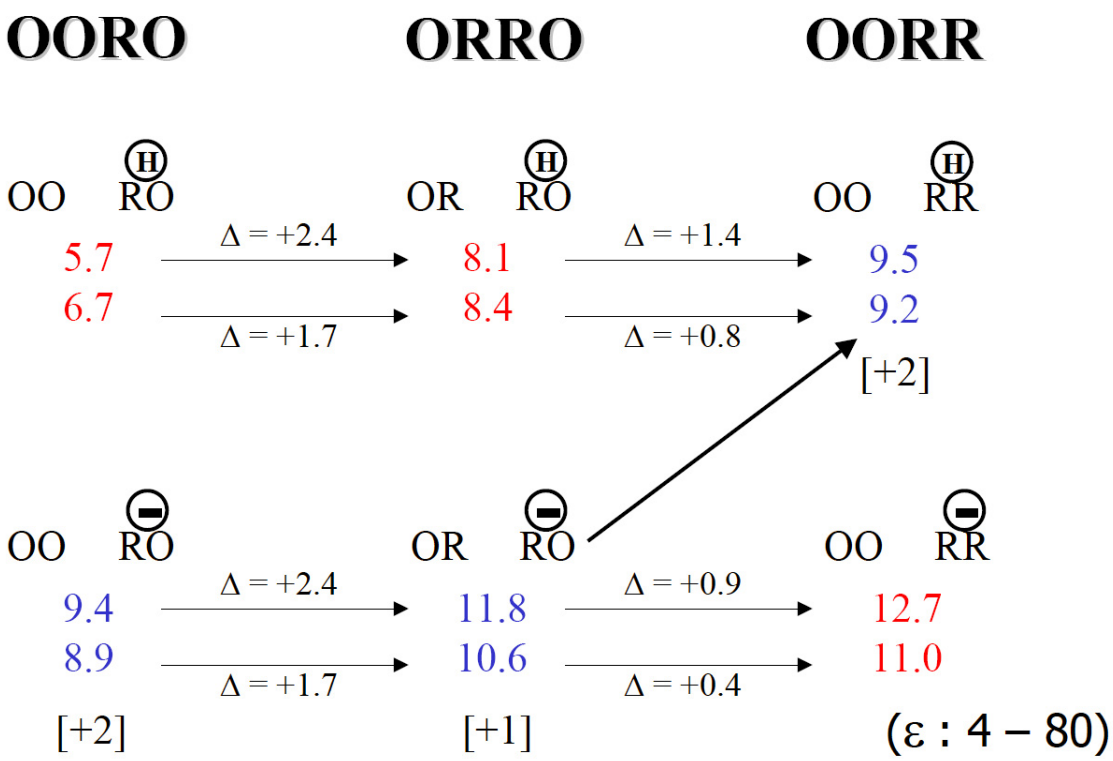

Figure S1 (C) The results for the dielectric condition of $\varepsilon_{prot} = 20$ and $\varepsilon_{cavity} = 20$.

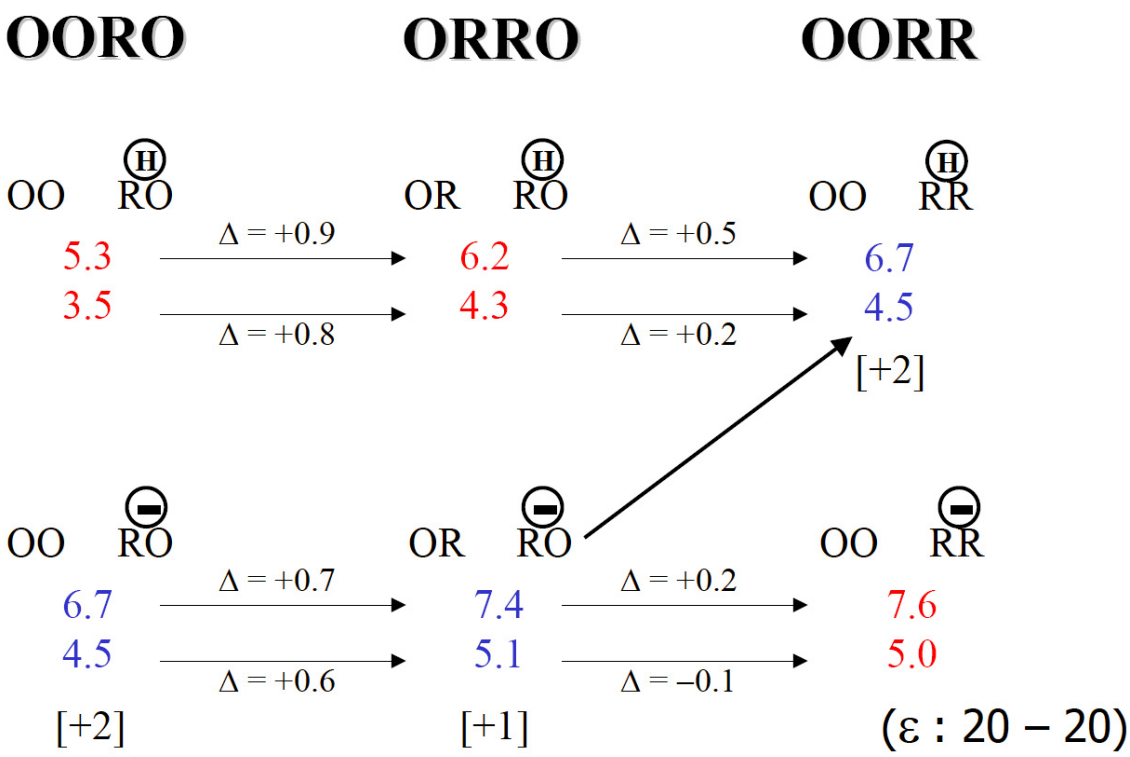

Figure S2 The influence of the redox state of heme *a* and Cu_B and the protonation/ conformation state of Glu242 on pK_a of His291, for three different dielectric conditions in our calculations ($\varepsilon_{prot}/\varepsilon_{cavity}$ = 4/15; 4/80 and 20/20). For each redox state, four different pK_a values of His291 are given depending on the protonation and conformation state of Glu242. The upper left number refers to protonated Glu in downward conformation, down left – protonated Glu in the upward conformation, upper right – deprotonated Glu in downward conformation, down right – deprotonated Glu in the upward conformation. (Also see Figure 3A-D in the paper.) The arrows with the numbers display the influence of an additional electron on heme *a* or Cu_B on the pK_a of His291.